

17 the visco-elastic member being disposed in a substantial center of the
18 piezoelectric vibrator,

19 the visco-elastic member having a bottom face area which accounts
20 for about 11% to about 80% of a bottom face area of the diaphragm,

21 the visco-elastic member comprising first and second visco-elastic
22 members provided on opposite sides of the piezoelectric vibrator, and

23 the first and second visco-elastic members comprising different
24 materials or different shapes.

1 2. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the visco-elastic member including two or more visco-elastic
13 members stacked on top of each other, and

14 the two or more visco-elastic members comprising different
15 materials or different shapes.

5. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the visco-elastic member comprising two or more visco-elastic
13 members having mutually different values in at least one of specific gravity,
14 Young's modulus, and internal loss, and

15 the two or more visco-elastic members are disposed in a concentric
16 manner.

1 7. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm, and

12 the piezoelectric vibrator having at least one aperture, the at least one
13 aperture being at least partially filled by the visco-elastic member.

1 8. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the frame having a horn-like configuration including an opening, the
13 opening having a gradually increasing cross-sectional area away from the
14 piezoelectric vibrator and toward a final opening at which soundwaves are emitted,
15 and

16 the visco-elastic member having a conical configuration having a
17 gradually decreasing cross-sectional area away from the piezoelectric vibrator and
18 toward the final opening.

1 10. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the visco-elastic member including notches in at least one portion
13 thereof.

14 11. (As Amended) A piezoelectric loudspeaker comprising:

15 a piezoelectric vibrator including a diaphragm and a piezoelectric
16 member provided on at least one face of the diaphragm, the diaphragm being
17 vibrated by the piezoelectric member;

18 a frame for supporting the piezoelectric vibrator; and

19 a support element for supporting the piezoelectric vibrator at a
20 substantial center of the piezoelectric vibrator,

21 the support element including a conductive portion in electrical
22 contact with the piezoelectric vibrator, and an electrical input is applied to the
23 piezoelectric member via the conductive portion, causing the piezoelectric vibrator
24 to vibrate.

25 14. (As Amended) A piezoelectric loudspeaker comprising:

26 a piezoelectric vibrator including a diaphragm and a plurality of
27 piezoelectric members provided on at least one face of the diaphragm, the
28 diaphragm being vibrated by the plurality of piezoelectric members; and

29 a frame for supporting the piezoelectric vibrator,

30 wherein different voltages are applied to at least two of the plurality
31 of piezoelectric members, and

the plurality of piezoelectric members being defined by at least two split sections of the visco-elastic member provided on at least one face of the piezoelectric vibrator.

18. (As Amended) A piezoelectric loudspeaker comprising:

a voltage applying means for applying a plurality of voltages;

a piezoelectric vibrator including a diaphragm and a plurality of piezoelectric members provided on at least one face of the diaphragm, the diaphragm being vibrated by the plurality of piezoelectric members;

a frame for supporting the piezoelectric vibrator;

wherein at least two of the plurality of piezoelectric members have a different voltage applied thereto from the voltage applying means; and

an electrically resistant element for interconnecting at least two of the plurality of piezoelectric members.

19. (As Amended) A piezoelectric loudspeaker comprising:

a piezoelectric vibrator including a diaphragm and a piezoelectric member provided on at least one face of the diaphragm, the diaphragm being vibrated by the piezoelectric member;

a frame for supporting the piezoelectric vibrator;

a visco-elastic member provided on at least one face of the piezoelectric vibrator, the visco-elastic member being disposed in a substantial center of the piezoelectric vibrator, and the visco-elastic member having a bottom face area which accounts for about 11% to about 80% of a bottom face area of the diaphragm; and

a plate for connecting at least one said visco-elastic member to the frame so as to damp unwanted vibration of the piezoelectric vibrator, an enclosed space being formed by the plate, the frame, and the diaphragm.

1 25. (As Amended) A piezoelectric loudspeaker comprising:
2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;
5 a frame for supporting the piezoelectric vibrator; and
6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,
8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,
10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,
12 the bottom face area of the visco-elastic member is equal to or
13 greater than the bottom face area of the piezoelectric member, and a diameter of
14 the visco-elastic member is smaller than the inner diameter of the frame, and
15 the visco-elastic member covering an entire upper face of the
16 piezoelectric member.

1 Please add new claim 27.

1 27. (Newly Added) A piezoelectric loudspeaker comprising:
2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;
5 a frame for supporting the piezoelectric vibrator; and
6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm, and

12 the visco-elastic member having a conical configuration having a
13 gradually decreasing cross-sectional area away from the piezoelectric vibrator and
14 toward a final opening.

As
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